1951

doc. 474

K.M. Waage COLORADO - FRONT RANGE CLAY

1951 NOTEBOOK 3


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* in dr. 22/4, 5 [CM 1994] see 7869

N 41° E, 36° 3'

Mines Reports

1950

Boulder County
no clay mines listed

Douglas County

Johnson Clay mine, at Castle Rock.
Co: Stroud Wisenhunt
adress Castle Rock
Mgr " " both
prod: plastic clay, 26,215 T

CH

Helmer Mine at Littleton
Co Helmer Bros. R 1 Box 94 Littleton
mgr Denver Sewer Pipe Co
adr 4501 Fox St. Denver
period fireclay: 1282 T

CH

also: Helmer mine, same adress & same people: producing white sand, limestone, & fire clay: 7697 fireclay.

CH

Hogback mine at Littleton
Co. Robinson Brick Co
adr 500 S. Santa Fe, Denver
mgr same as above
prod plastic fire clay: amt not given

1.

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El Paso County

Hecla Clay mine
at Colo. Spgs.
Co Standard Fire Brick Co
adr 24th & Albany Sts, Pueblo
mgr Stan. Fire Brk. Co.
adr Box 65th, Pueblo.
prod 1945 T plastic clay
(H)

Larimer County

Fort Collins Brick & Tile Co mine
at Fort Collins
Co Fort Collins Brick & Tile Co
adr 209 Colorado Bldg Fort Collins
mgr Fred Kluver,
adr see above
prod 2500 T clay (listed as clays, soft shale)

134
24
1674

1.5
~~820~~

1,5
820
300
120
12300

786
1,5
3930
786
11,790

# 1949

See number in annual report

1 1238 T fireclay
2 fireclay T not given
3 fireclay: 820 yd$^3$
4 3032 tons fireclay
5 60,000 T granite
7 325 T plastic clay
8 2946 T wh. plas. clay 2451 T fireclay
9 9,099 short tons fireclay
10 8158 T clay
11 8800 T fireclay
13 34,487 plastic clay
14 22,537 plastic clay
15 420 T fireclay
16 786 cu. yds. fireclay
17 6674 short T fireclay
18 2570 T Bastard clay & shale

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1948

Douglas County

Johnson clay mine at Castle Rock
Co H.6. Johnson Co, Castle Rock
Mgr Stroud Weisenhunt, Castle Rock
prod 18,460 T plastic clay.

CHJ

Hogback Mine, at Waterton
Co Slocum Bros, Littleton
Mgr Robinson Brick Co, 500 Sante Fe, Denver
plant noperate 1948

El Paso County
Hecla clay Mine, at Hooved
Co Standard Fireclay Co, Box 654, Pueblo
Mgr R.A. Barber: Rte 3, Colo. Spgs.
prod 3450 T clay.

Jefferson County 1948

1 503 T clay & feldspar
2 14,312 T clay
3 3434 T fireclay
4 6957 T fireclay
5 4767 T clay
6 not given
7 " "
8 33,529 T plastic clay
9 20,234 T plastic clay
10 4688 T fireclay

Larimer County 1948

11 2500T clay

1947

Douglas County

1 18,060 T clay
2 5886 T fireclay

El Paso County

3 1027 T Plastic clay

Jefferson County

4 775 T clay
5 12,365 T clay
6 13,651 T clay
7 11,186 T clay
8 not given
9 31,192 T clay
10 11,283 T clay
11 not given

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1946

1 924 T fireclay
2 18,246 T plastic clay
3 167 T plastic clay
4 531 T clay
5 2623 T clay
6 Plastic: 10,476 T, Fire 4552 T
7 6595 T clay
8 3088 T clay
9 8910 T clay
10 20,426 T clay
11 7167 T clay

924
18246
167
531
2623
10476
4552
6595
3088
8910
20426
7167
83,705

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1945

Douglas County

724 Helmer Fire Clay mine at Sulica opd by Helmer Bros, Rt 1, Box 94, Littleton

6690 Johnson clay (p/a), at Castle Rock, op'd by H. G. Johnson, Castle Rk.

El Paso County

10008 Hecla Clay (p/d) at Husted, op'd by R. A. Barber, Rte 3, Colo Spgs.

Jefferson County

556 Coors clay mine, at Golden, op'd by Coors porcelain Co, Golden.

3554 Fire clay mine, op'd by Grant Parfet, Under Bldg, Golden

7687 Golden [illegible] plant, op'd by Golden Clay mining Co, Box 292 Golden.

4748 Johnson Clay mine & Plant, op'd by Denver Sewer Pipe & Clay Co, 45th & Fox sts. Denver.

2924 Lindsay clay mine, op'd by Geo. W. Lindsay, 1931 Forest St. Denver.

6546 N. Clay [illegible] Plant. Denver Fire Clay [illegible] Denver.

7.

1945

| | |
|---|---|
| 12/50 | Rockwell clay mine, opid by Geo. W Parker Est. Ire. Lindsey Bldg, Golden |
| 3533 | Ruby clay mine opid by H. M. Ruby clay co. Lindsey Bldg, Golden. |
| 543 | South clay mine, Denver Fire Clay Co, Box 5510, Denver. |

2.8

.2
1.3
.4
.9
.4
1.6
.6
12.0

Ralston Reservoir section

Est. 12.5 — [ 25'= slope distance, slope ∠ = 25°
Use equation (4) Billings p 149 — N 70°W = Azimuth measurement.
Dip of beds 55°E, Strike N5W

[illegible] on plate, lite gray weathers silt stone. Removable out to lite gray weathers with silty shale partings. Upper pebble zone base

41.6 — Sandstone, [illegible], medium [illegible] intraformational and pebble [illegible]. Lite gray to weathers silty clay stone. Much ripple marked bedding on bed surface. Weathers buff

13.0 — As above with less intraformational beds. Weathers buff

2.6 — Shale, gray to black —
Upper 2.0, Gray to dk gray clay, silty in upper part. About .C 25 bentonite at base
0.4 thinly carbonaceous silty clay, about 0.1 bentonite at base
0.2 boney clay

3.6 — Fine grained, [illegible] silty to argillaceous ss. some shale plys between beds

0.4 to 1.0 — Silty sandy clay shale

4.8

| | |
|---|---|
| 3.6 | Sandstone, fine grained, laminated with dk. silty streaks |
| 3.4 | Interbedded gray silty claystone, shale and argillaceous siltstone & siltstone. Upper 1/2 chiefly shale & clay, and, lower beds si |
| 2.6 | Sandstone, fine grained, laminated with dk silty streaks. |
| 1.7 | Dk gray ~~gr~~ to black silty ~~to very silty~~ clay with laminae & interbeds of siltstone - chiefly in lower 1/2. |
| 6.5 | Sandstone, fine grained dense massive lite gray |
| 1.0 | Hard silty shale, weaths lite gray & blue gray |
| 2.1 | Dk gray to black argill. siltstone some zones shaly, weathers dark, greenish crust |
| 0.2 | Bentonite |
| 5.0 | Interbedded dk silty claystone (ss in 2.4 above) and fine grained sandstone. |
| 1.9 | Dark gray to black fissile weath shale. |
| 2.2 | Fine grained argill. siltstone, loc. ss with shale ptings in middle part. |
| 1.6 | Gray silty clay with white Fe specks, concr fractures local Fe stain. |
| 5.2 | Interbedded argillaceous siltstone and fine ss, local thin beds silty sh. whole irreg. bedded. Shale mostly in upper 1.5 |

Clay bed

1.6 Silty light gray dolostone + argill. siltstone

1.8 Dk gray silty shaly clay with thin beds + laminae of salt

.6 to 1.0 Concretionary zone, Fe concs. locally present in band of lenticular siltstone.

5.8 Dk gray to dk gray shaly clay, locally silty, laminae of white Fe specks.

5.9 Clay as above

0.2 Platey argill siltstone + silty sh.

A { 0.3 Bentonite
1.5 Platey ripple marked siltstone, grades to interval below.

4.1 Fine grained ss, lite gray to buff, massive, carb. frags scattered throughout, thin beds hard dk argill. siltstn in lower 2.0

2.7 Dk gr. silty clay stone + loc shaley, with dk argill. siltstn beds. 1.0 bentonites at top + base ← question mrks?

.8 Argill. fine ss + siltstn.

3.6 Highly carbonaceous to blk shale, silty, locally argill siltstone

24.0 Sandstone, fine gr, banded + laminated with siltstone + argill. siltstone. Bedding irreg, local zones. Plant stem frags common. SS weathers O Brown + lite gray. Much plant frag. + loc med ss beds

Clay zone

.3 Shale, dk gray silty

.3 Bentonitic

11

| | |
|---|---|
| 3.0 | Shale, dk grey-black fissile, silty. |
| .4 | Bentonite. |
| 2.2 | Silty sh + shaley siltstone, ferruginous siltstone layers in upper 1 foot |
| 4.3 | In gradation siltstone and silty shale chiefly, shale in upper half, siltstone and ss in lower. ss- grey, fine grained, beds up to .4 |
| 4.4 | Sandstone, massive x-bedded, med-gr. beds to 2.0 |
| 15.0 | Irreg bedded fine to med ss in alternating resistant + friable beds which with local zones of concretionary rock. Weathers grey with Fe stain in some beds |
| 2.2 | Similar to above but with shale partings + thin beds coming in and increasing in proportion to ss + siltstone. Lower ⅔ chiefly shale |
| 33.0 | Partially concealed with hard beds protruding. Interbedded ss + siltstone + shale, siltstone and ss in beds 0.1 to 0.3 thick. In lower part most common, upper ⅓ more shaley + siltstone + ss |
| 3.8 | Fine to med gr ss fr |

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locally, thin bedded to massive, beds up to 1.5, weathers buff.

3.0 Obscured — Interbedded sandstone and [illegible] shale.

3.8 Chiefly platy ss, shale partings

7.2 Obscured, may be like 3.0 above.

3.9 Sandstone fine to medium grained. Shale in upper 1.6, [illegible] weathers, weathers buff.

.6 Dark green silty shale

6.5 Sandstone massive x-bedded with thin layers of cgl. [illegible] Thick channel bed, cuts into 4' up

Slope

.4 to 2.0 Ground [illegible]

3.0 Sandstone, fine to coarse and medium, [illegible] at top [illegible] weathers buff.

5.5 Chiefly [illegible] sandstone, [illegible] at top.

3.4 Friable sandstone, pinkish brown, [illegible] medium grained

4.4 Interbedded sandstone [illegible] hard, cemented, [illegible]

.8 Conc. [illegible] Fe cemented.

.8 Green sandy [illegible]

10.5 Obscured but contains [illegible] shale with subordinate [illegible] sandstone, fine to med. grained.

1.0 ± Red [illegible]

| | |
|---|---|
| 2.6± | Greensandy clay |
| 3.0+ | Sandstone, lenticular, massive, pink-brown weath, fine, red. Fe specs |
| 2.0 | Green sandy clayey clayst |
| 3.0+ | Sandstone, like above - loses out with grey-brown clay |
| 1.5 | Green silty clay - calc |
| 5.5 | Sandstone, lenticular, massive, pink-brown, fine, where Fe cement |
| 7.8 | Silty clay, green with some red in base, calc, fissile |
| 3.7 | Sandstone, massive, fine to med. Fe specks - red |
| 12.7 | Silty clay, obscured by wash, mottled red-grey, calc, some green below, part grey |
| 1.0 | Conc. zone - 5c sample |
| 6.0 | Shelly green clay, some sand |
| 1.3 | Fine sandy ss, Fe specks (coal?) |
| 1.5 | Medium grey-brown clay, calc |
| 2.5 | Sandy ss |
| 5.3 | Sandstone, fine to med grey, X-bed, lenticular, fissile, calc, mottled in part |

2.0

3.2

.2

2.1
1.3
1.9
1.7 9
1.4

Colorado Springs area. Section #1 on Rt 338, Bear Cr
road cut in vertical strata.

Dakota — Top contact marked transition zone
0 — Clay, silty

40.6 — Massive, fine- to medium-grained ss, cross-laminated. Buff weathered. Ripple bedding planes in zone 1 to 4 sq. 1 to 4 x

Discont.

2.6 — Clay, silty, and argillaceous siltstone, upper 1.3 silty grayclay with pea-size Fe blebs remainder dk gray silty clstn & argill siltstn with 1 or 2 beds lite gr siltstn, v fine ss except 0.2 thick

4.2 — Interbedded light-gray, hard, fine ss, beds .4 to 1.0', and dark, silty to sandy sh and dk argill. siltstone.

Discont. (Paved)

35.5 — Sandstone, massive x lam. channels of fine to med grn. quartz sand, a few small zones with cavities, weathers Fe brown. Local zone at base

0.8 — Clay, silty, weath brown.

5.8 — Dk gray to black, plastic with silty clay and beds & lenses siltstone. Most silty in upper 2.0, where silt predominates. Lower 3.8 scattered 1/2" beds & lenses silt, 1/4" bentonite at base.

5.5 — Dk gray to black plastic clay

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Measurements slightly over-stated. Checkers subtracted about .5

every few ¼' beds siltstone. Some Fe stain on fracturas. Sample CS1 = upper ½ CS2 = lower ½

6.0 Gray to dark gray silty clay with zones argillaceous silt and local bed siltstone (QZ bed at base) upper 1.0 argill. silt then about 3.0 of dk g. silty clay, then highly silty clay + silt

7.2 Gray silty clay with local laminae + thin beds silt, partic. in base 2.5

2.2 Laminated silt, argill with argill ptngs Grizzly.

9.0 Gray argill siltstone + hi silty clay. Locally, laminae is massive ledge conc. Fe stone 1 to 2.0 thick

5.0 As above with 0.4 bentonite rem. silt at base

16.0 " + " , less silty in upper ½

10.0 Gray silty clay w/ thin silt

0.4 Bentonite.

11.3 Dk gray highly silty cl. + argill siltstone

10.0 Silt, argillaceous, some lamination

6.4 Argill silt with zones silty clay with silt beds laminae at base 1' siltstone base with thin gradational dk clay on top

2.87 Upper 2' silty argill grading to argill silt, lower 1" dk pl. clay with silt bed top + 2" bed base

6.6 Alternating beds of gray argill silt and dk plastic clay with silt beds + laminae. About 50-50. Sequence of beds as in 2 above. 3' silt at base

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9.5 Interbedded dk gray plastic clay, highly silty clay and thin beds & low
Saltstone. Dk clay with thin silt beds
predominate

3.5 Arm. argill, carbonaceous, s[illegible]
Sh & lignite - white weathering, with
thin stringers of silty clay in white
soft forcible.

19.0 Greenish silty clay mud, with sh with
some red tuffs & dinothica Fe spotted.
Base covered by mud

Obscured

In shallow above suspect faulting
Sandstone in shale is fossil below
Lakota

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9.2
10.2
13.6
8
41 0

Section #2 - Columbus Grove - N. of

| | |
|---|---|
| 1.0 | Black shale |
| .6 | Nodulous conglomeratic stra |
| 7.4 | Clay |
| 1.0 to 2.5 | Medium grained sandstone, massive light green [illegible] Heavily stained with Fe in upper .6 |
| 1.6 | [illegible] red & gray - [illegible] pack joints 7.4 above to form [illegible] in Section #1 |

Note

[illegible]

| | |
|---|---|
| 41.0 | [illegible] Red in upper 3 [illegible] green |

Canon City - Skyline bogback - Section

Start in new bed below bedrock at the Fe impregnated cap on massive ss, at base of the Fe mineralization zone. The Fe zone has massive sandy red mudstone pisolitic siltstone & shale, just to SE of where DCC member comes in.

82 Sandstone, massive, cross bedded in cross-lam, fine - medium grained, rather light grey and buff. [illegible]

5.4 Sandy clay with thin zones of lam. siltstone. The latter commonly Fe stained

.7 Pisolitic siltstone in lower interbedded silty sh. excludes interbeds of efloresced silty bentonitic shale

3.0 Pisolitic argill siltstone & fine ss, beds av. .6, thin bedded shale.

2.6 Shale, silty, grey, interbed. silt sh.

.5 Sandstone massive, fine gr, buff weathering irreg.

.6 Silty sh. & grey shale, white efflorescence [illegible] but no good bed. [illegible] material seen.

Note - another outcrop this interval 5 sandy shale at top 1.5 silty zone with thin interbeds bentonite in lower 1.3.

11.6 Massive, x lam med gr ss, buff weathering with local .6 bed of [illegible] material (tuff?) 3 [illegible] top. Base

19

4.2 the lss becomes thinner bedded with rip marks on bedding. Some cross bedding near base, bed 20 is shaley & contains ferruginous zone 5 cm crop .4 above base. This pinches out along strike.

3.
3.
2.0
4.1
3.2
5

2.5 Shale + sandstone, dk. gray clay shale with lenses and nodules of siltstone. Upper 1.7 predom. shale + siltstone, lower part siltsh grading to fine ss at base

2.0 Fine grained, massive buff weathering ss,

4.4 Irreg. interbedded siltstone, fine ss and shaly siltstone. Weathers like gray shale. Ss beds thin, locally lateral to Au. .4 to .6.

4.0 Shale - Dark gray to blk, fine silty, micaceous siltstone. Thin upper 1.4 and lower 2.8. Thin bentonite at 2.6. Some coal nodules found 2.0.

20.6 Sandstone fine grained, friable, well bedded with Fe stained laminations + giving shelfy appearance. Local interbeds siltstone. Upper part (1.25) beds av. .4 to .6, lower more massive but platy fracture,

.2 Bentonite

6.3 Interbedded silty dk gray shale + siltstone. Thin bentonite 2.8 from top, resting on .8 bed siltstone.

6.3 Sandstone, fine gr, beds .8 to 1.2 ft. buff weathering, locally silty.

1.0 Sandy shale + fine ss, essentially a shaley unit but grades int. into dk gray sandy sh. + sh, which is very buff. Locally sh is calcite cemented

1.0 ± Conglomeratic + cgl. ss, chert pebbles, poly.
Disconf.

14.0 Sandstone, massive to low buff weath. Medium to coarse with occ. chert pebbles in lower cgl, minor plant fragments

3.0 Interbedded ss as above, and cgl. ss, + sandy sh, dk, with carb. traces — All plant debris. Many plant fragments

3.0 Sandstone, massive X bed. Chert pebble conglomerate in with plant frags. Minor cgl.

1.2 ± BK gray sandy shale with plant frags and local sandstone with plant frags
Disconf.

18.3 Sandstone, Mass. to lgh-gray, weathers buff with pink cast, coarse, pebbly with zones cgl throughout. Low to med locally light grey due to quartz pebbles. Thin unit varies in thickness from about 1 to 15 ft. Lenses of green silty clay ironstone

Lateral lenses of green silty clay ironstone come in to break up the unit into several beds of sandstone. Also ss locally gets quite argillaceous and grades into shale

Disconf.

action below to Tiers Joyn. road

| | |
|---|---|
| 7.1 | Fine to medium ss, & argill. ss with intervals steady claystone, greenish to pinkish cast at base, [illegible] clayey seams |
| 1.6 | Curly grey [illegible] clay & clay |
| 3.4 | Argill siltstone & fine ss green & brown, mottled green, sandy ch. Yellow weath, |
| 10. | Alternations of soft to hard red ss & clay. Hard, fine gr, red ss. Massive, weathers [illegible] exposure, lower part argill. recovered; [illegible] clay & clayey beds with red & green ch. splits |
| 4.0 | Greenish gray silty to sandy ch. chocolate to brick red along fracture |
| 4.9 | Sandstone ss & 3' shale, also with argill zone, here at top, & fractures to split to double bench with red ch's between. |
| 11.5 | Silty green & gray ch with local red zones |
| .8 | Fine grained, hard, ss, loc. argill. |
| 14 | Silty clay & argill siltstone interbedded, alternating, green-gray & maroon, with silty beds chiefly green |
| 3.8 | Interbedded hard, resistant clean siltstone beds (red) and argill siltstone [illegible] chiefly dull red some green & black |
| 3.7 | Fine to coarse grained hard sandstone with scattered small pebbles of chert & red jasper, fines [illegible] |

5.7 (cont.) - looks like ... scour lens ... both prob freezeable

Discont.

4.2 Interbedded fine grained, hard ss and silty rock ... grades into argill siltst.

Type Lytle

Surface of bluff shows chalcedony [illegible]
of SS as in 7.0 [illegible]

7.0 Massive beds of gritty, fine-med locally coarse x bed & x lam. bed 6 to 2 buff weathg.

disconf.

47.5 Massive [illegible], fine-med locally coarse [illegible] cgl [illegible] white. [illegible]

Obscured

Colorado 115 section at Dakota hogback betw. Turkey + Rock creeks.
Section pieced from outcrops along ridges N + S. of road as well as along road cut.

NW side of ridge in bluff - ps
(Glen Canyon)

11.8 Irreg. interbedded siltstone and argillaceous siltstone, and fine-grained sandstone. Ss predominates in upper 7.0, below this beds progressively more argillaceous + some ptgs of silty clay.

3.0 Shaly argillaceous siltstone and some silty shale, dk gray to brownish gray with thin interbeds siltstone & fine ss.

4.6 Obscured by wash, due to weathered surface, shows a gray highly silty shale with yellow + orange Fe stains

—NOTE— may be small fault here or just weathering along fracture plain.

1.7 Dk gray plastic clay, ~~sandy~~ silty, with Lingula.

19.0

| | |
|---|---|
| 3.0 | DA gray highly silty clay with a few zones silty clay and scattered fine silt laminae. Lower .6 almost argill. silt. |
| 0.15 | Bentonite. |
| 0.4 | Argillaceous siltstone |
| 1.0 | Dk gray clay shale, slightly silty |
| 1.3 | Med to fine ss, argillaceous, ferruginous An unbedded mixed zone with some coarser grained streaks, argill. mat is cash brown & in irreg swirls. Locally a zone of coarser friable ss with small chert pebs at base & where this present no obvious discont with bed below |
| Ripple marked surface. | |
| 3.0 | Massive fine to coarse, locally conglom. ss Grade from siltstn to cgl upward. Cgl. concentrated in upper .6, the local stringers as much as 1.0 into bed. |
| discont. | |
| .3 to 1.2± | Silty clay stone, sandy, light gray with pink streaks. |
| 1.0 to 2.0 | Massive fine grained ss, pink brown weathering similar to above |
| 13.8 | Covered with slope wash - shows patches weathered clay stone, grayish color. Some sand red stained zones in lower part, |
| 38.0± | Sandstone massive, x lam., and to conglomeratic — cgl zones narrow Type Lytle. |
| Base Penn. | |

Section #2

Trenched shale slope above ledge SE rd cut. Fine recovery and prob. some slump loc. but best sect. available

Talus

5.8 Dk gray shale some silty zones.

3.3 Highly silty clay and argillaceous silt, gray

X 0.4 Bentonite [Key bed for correlation with sect 3]

4.1 Black, plastic clay, vertus fissile

3.3 Dk gray to black silty plastic clay with beds siltstone in upper foot Possibly ½ bentonite at base

10.0 Siltstone, upper 5.5 ft resistant, interbedded in beds. Irreg. bedded with some fine ss, + some [illegible] structure. Lower 4.5 is soft, argill. accessory siltstone with beds and irreg. layers of silty gray silty clay

6.0 Tuffaceous silty clay and sandy silt beds [illegible]. Silt stone prominent.

0.9 Silty bentonitic shale — has thin gray bentonite stringers.

3.5 Dark gray silty clay, some [illegible]

0.1 Bentonite

4.2 Dk gray silty clay with scattered silt + sand [illegible]

6.0 [illegible] silty clay argillaceous [illegible] gray, some thinly [illegible]

15.0 Siltstone & sandstone. Upper 5' irregularly bedded siltstone & fine ss, argill lam. as thin carb irreg laminae. Lower 10' is progressively less sandy and more ~~silty~~ argillaceous to ~~ill~~ at base is chiefly argill. siltstone & silty shale.

6.0 Silty clay, gray to dk gray local zones silt & argil. sl.

1.9 Dk gray ~~l~~ local clay, ~~little~~ fairly silty, Lingula

2.0 Dark gray silty clay.

1.5 Dk gray silty clay with thin zone of silty light clay — maybe bent.? ~~3~~ ½' top.

.5 Sandstone, hard med. gr., fe stained cemented

1.1 Irreg mass med. gr. ss and clay sandy argil. siltst, some fine cgl pieces.

.4 to .6 Cherty cgl. ss, ferruginous, caps ss below as the pcs of it ~~but~~

Little contact

4.7 Tan clayey massive fine gr., ~~x~~ lam. pink brn weathe.

3.4 Interbedded ~~—~~ and argillaceous ~~—~~ lt weaths pink ~~—~~ ss fine gr. weaths tan pink cast.

42.0 Sandstone, massive ~~—~~, med to cgl at c. Conglom chert in lower half

Discont. 10.0 Slope-wash ~~—~~ ~~—~~ ~~—~~ at top & thin ~~—~~ ~~—~~ covered.

14.0 Massive ~~—~~ med gr to ~~—~~

3.5
1.9
4.5
5.7
2.5
2.0
1.7
2.3
2.2
1.9
3.6
1.9
2.0
1.1
1.5
1.7

sandstone, locally with conglom (chert pebble) layers.

Base of ss not exposed.

Section 3 – Road cut w side – from top bent route of above section up.

↓ Bentonite — road cut (.04 bentonite top Sec. 2)

5.6 Lower 4 to 4.6 is black shaly [illegible], fissile. Upper 1' bit arenaceous silty clay bentonite.

6.0 (approx) Gray clay and silty clay, upper 3.5 has most silt.

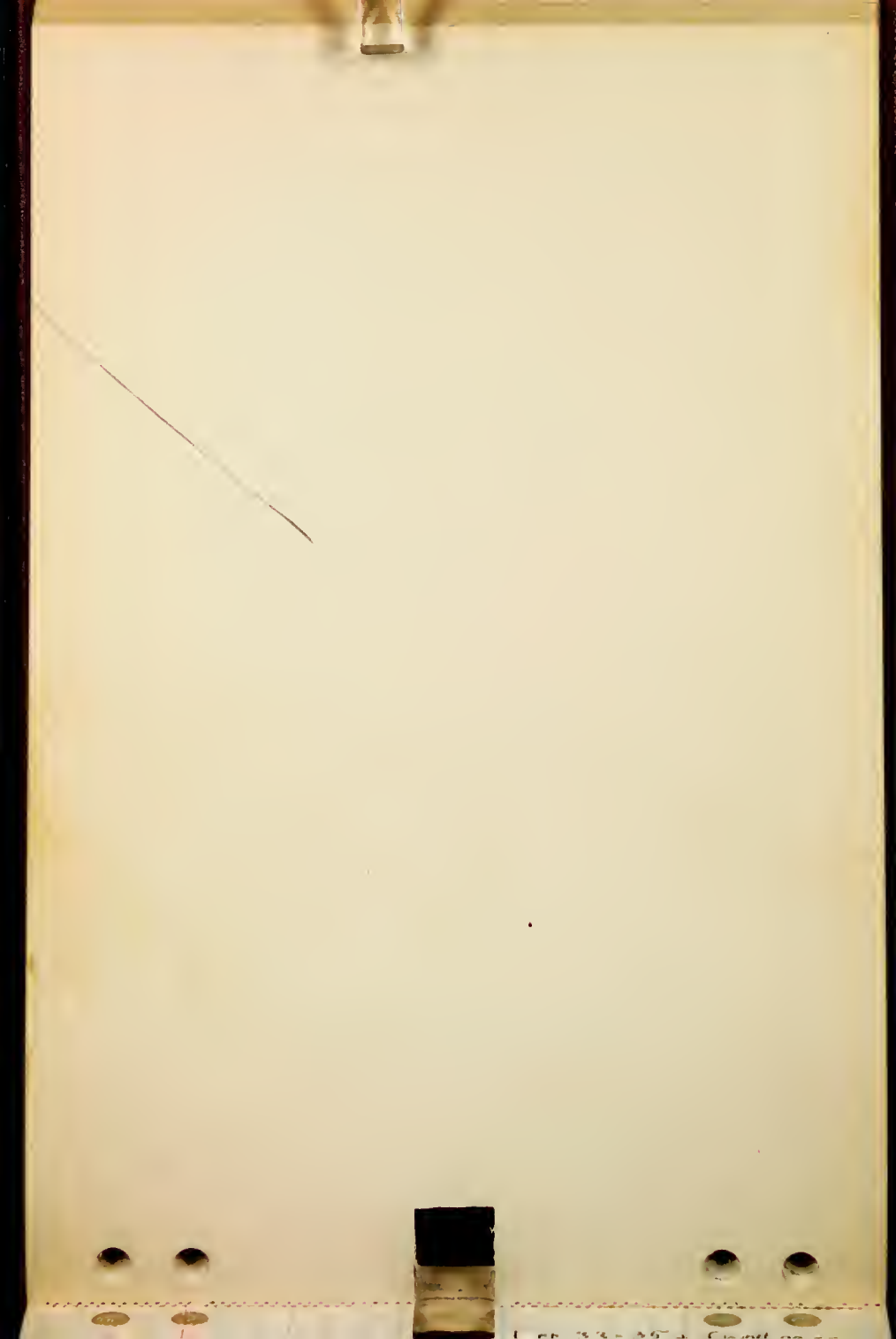
5.5 Broken up ss, prob ~~some ss. b~~ belongs interval ↓ but not struck in place.

49.7 Sandstone, fine to med. grained, heavy bedded qtzitic beds .4 to 6.0 but thick bed in upper 12' and 2v. close to 1.0. Beds x-lam some shaly seams between beds. Weathers Pink brn

3.2 Shale, dk gray, calc in base, [illegible], with two intrabeds lt gy ± silt & silty lam. [illegible] upper foot. Base [illegible] with red-brown weathering

base. Whole bzss' grey zone may be

| | |
|---|---|
| discont | bioturbated fuleg. x lam. |
| 4.8 | SS. massive to platey + bzse with |
| | shaly zones in lower rest. |
| 5.1 | SS., fine to medium w/ beds up to 2.0 |
| | but mostly thinner with some l.b. |
| | black shale + ptgs. locally |
| 1.3. | Fine ss + grad. siltstone, irreg. bedd. |
| 2.0 | Conch. fract. grey silty claystone, |
| 4.2 | Fine grained grad. ss and interbeds |
| | of silty shale. |



[pp. 33-35 + front pages removed as doc. 503 - see acc n 7869 — E. Mac]

Cochetopa Canyon Section — Sec. 19

↓

Morrison — Greenish silty clay stone with Fe brown weath interbeds siltstone + sandstone; argillaceous.

P 8.0±

Ans. 10±

Fine silty clay stone, ... green ...

14.0

Sandstone, medium coarse with scattered pebbles Fe specks. Whole x lam.

(Above this unit there locally appears a shale break that separates off the ledge above by from 5 to 10 ft. Laterally the bytle comes into the unit above channelwise + joins it — this ... for ...

98.0

Massive cliff-forming ~~coarse~~ med. gr ss. x lam. with zones calc ss. Local shaley zone 1' thick 40' above base gives red weath locally x Fe stained cap on ss below. Another zone shaly shale 27½ above this

[12.0 Sandstone] help for Taylor

19.0

Shale dk gray, ... cal ... above with some ... bedded ... ss ...

Det. further above Slope — ss for 12 ft. then 8' of argill ss, siltstone, platy argill ss, some calc. weathers lite ... with pink stained ... ss.

2.5

friable, loc. of strict ledge ... loc. ... argill ss weathers dk rusty br. ... scattered ... — This is base ... Cal.

Cuba 22 section 2.

↓ from base Doherty ←

9.0 Irreg. interbedded, fine ss and siltstone with local intrabeds highly silty dk shale. beds .2 to 1.0 thick

5.5 Silty dk gray shale with intrabeds argill. siltstone.

15.0 Fine ss, in irreg. beds, x lam, with some platy layers lt. siltstone ~~stringers~~ minor amts silty sh. Whole weathers irreg ledgy buff to Fe brown.

1.7.5. Wash covers up to hard bench.

Obscured.

Section

Scattered pebbles

2.0 Hard bench, massive ~~stringers~~ ss to .2 to 1.0+ Shale, locally dk gray silty, to slightly ss.

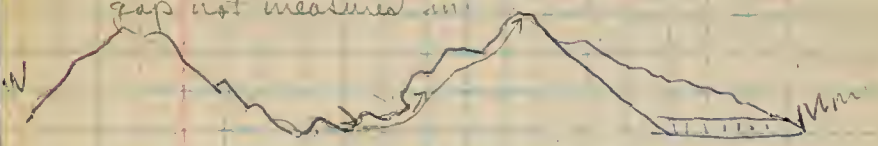
.4 to 1.0+ ss hard med to coarse with scattered pebbles.

3.0 Sandy light gray c/stn + argill. ss, ~~buff~~ light gray some pink stain, Massive bedding.

2, 1
2, 5

Holmes beginning section #1

Take up from near base of ~~not~~ lowest massive ss, ~~top~~ out crop of first ridge N. Gap. Other beds in gap not measured in.




↓

Obscured -

3.5 +? Sandstone, fine grained, massive, weathers Fe brown, pitted + irreg.

11.0 Obscured, with patches lite gray weath. shale + sandy shale interbeds fine ss + siltstone. Grades into unit above

25.0+ Sandstone, fine grained, some medium gr near top. Massive platy to x bed. weathers gray with Fe ~~brown~~ nobs + irreg ridges. Capped by Fe brown crust of ripple ridges ± .8 between crests.

5.0+ Silty sandy lite gray weath shale and platy siltstone

5.9+ Platy fine grained ss ~~one~~ lite. beds + siltstone. Lite gray weath, siltst has Fe brown bumps + platen layers.

> Locally shaly or clay zone in here but overlying unit cuts it out, + is loc. d posited in channels that cut into 5.9 above. Measurement below taken where discont. Base [illegible] rests on top of 5.9 interval

Discont.

96.0 Sandstone, massive, cross lam. & cross bedded. Fine to coarse with many zones chert pebble cgl. in basal ~~part~~ 25', a 3± zone of intraformational cgl with coarse ss on top of this, above this goes from coarse to med to fine upward, with thin local lenses coming in below and interval. The measurements given here represent maximum thickness of

Disconf.

.4 Bentonitic cl.

.8 Pixley siltstone

— Lower clay bed of Upper Clay unit in Chuzian

Luer's mine is in the upper Chuzian - by Ridge supported by excessively thick ss below upper clay.

Clay bed are 2 ea. about 9' thick and has sandy zone in middle.

In quarry
N. 30° W, 60° E

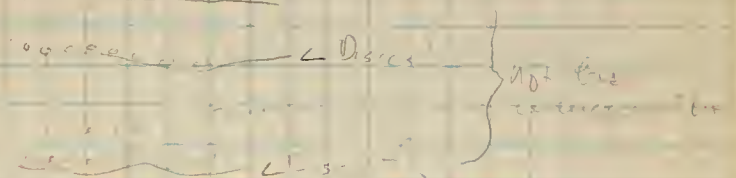
Helm. Ranch section # 1

Measured at gap in hogback, Helmer Ranch.
~~Loc. of sect. taken W. of gap. Is S~~
~~side Sec. 21, Upper T2 S~~ south of gap.
On N. side gap.

Measured from base up.

Contact
↓ 10.0± Green silty claystone, red zone in upper .6
5.0 Argill fine ss & sndy clstn, lite gray weathering
1.6 Sandstone, fine gr. massive buff weath.
2.0 Silty to sndy clstn. & argill fine ss lite gray weath., some red weath. zones
3.7 Sandstone, ss to s.c. fine gr., buff ~~to~~ weath. some basal intraclast end ~~Some~~ numerous shaly zones. ±lenses Cap weaths Fe brown has some cgl pebbles to ft surface. Local fine pocellaneous siltstone lens near top
Disc
Disconf. ~~Sand~~
51.0± Sandstone, massive, cross laminated fine to coarse, conglomeratic zones, Much cgl in lower 8'-chert pebble with lenses & thin strs red claystone locally. Upper 10 to 15' not very calcic.
5.5 Zone of claystone. Lower 1' red stained argill siltstone, then 4.5 of silty clay chiefly green-gray, red zones in upper 1.3. ~~Zone of [illegible]~~
Disconformity

19.0 Massive, xlam., fine to coarse SS with cgl zones in lower & upper parts. May be a double bed with upper part discont on lower thin




Disc.?

11.5 Shaly zone. Chert, obscured but loc. in lower 2' of shaly zone, which starts with zones pinstem. Upper part is silty shale shaly siltst. weathe like gray with Fe. stained silty layers.

The Glenwood-Lyndon contact in this interval but no cgl found.

6.8 Platy ss. at zone, fine, silty ptgs at top & base, bottom 1' bedded. beds .1 to .8 weathe Fe brown.

14.5 Shaly gray chert obscured, lower half is ~~argill si~~ silty gray shale & argill siltstone (predom), Upp sandy ss

38.0 Lower 10' [illegible] ss

5' of [illegible] siltstone

ls. - Irreg bedded fine ss (+ some s + siltstone in lower part of it) Whole weathers integ light buff to Fe brown local streaks Fe brown.

4.5 Interbedded silty, sandy shale and shaley-sandy siltst.

6.2 Platy siltstone + fine sandstone, weath grey with streaks Fe brown.

Disc

10 1.6 Sandstone, massive, x-bedd, fine to coarse + cgl. ss.
Cgl. is chert peb. one, chiefly in lower 10 feet thick beds cgl at base ... variable

* Disconf. 3.0+ ... sandstone, fine-g, massive, light grey ... Fe ... sl. ... Cuts across bedding of unit above A + is local product of clay unit's below it.

7.6 ... Shell ... thin layers and remains of s ... Contains vertebrae + appendages, in thin beds of boulder-size to basement, & platy siltstone.

6.3 Massive buff weathering ... sandstone.

.3 Clay bed ... Grey clay-shale clay-chiefly ... brown.

Disconformity

15,0 ... Sandstone. Massive cross-bedded, buff
Disconf. weathering fine grained. Intraclast at base.
4'6 Clay zone, basal 1 to 2 ft shale? silty to
sandy, clay at base ... is ...
Remaining 3 ft is silty ... weathered
... local ...?

Disconformity.
5 to 8' Massive ... fine ... buff ... weathering.
Not much exposed, goes under ... cover.
Covered.

AIN 49-08

1. The cgl ledge pet rs out here. Down slope the ss below it thicken and coarsens and below this thick ss at some level is cgl on road slopes cross zones, intracgl, and local small chert pebbles.

2. This ss is here 25' thick & coarsely cglatic It seems to be the one immediately under the massive cgl ledge taken as base Lytle

3. Good exposure of Glenarm - Lytle contact 3'+ of platy ss on white silty clay about 1" interval with clay

4. This recentrant in crest caused by intercalation of thin clay beds above the base of the massive cliff forming sandstone. There then channels in base. Do note, but - may correspond to 3 beds in top of what you have been calling Glenarm at Van Bibber & Dan Cooks. Here are only 2 beds at this outcrop.

Rusty zone present on slope

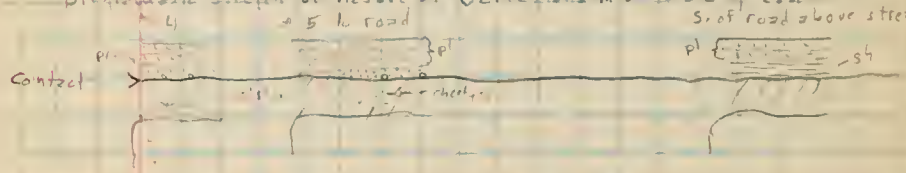
(see Z3 Nrbk 6, p. 25

AIN 49-08 (cont.

(5) From about this point south along the ridge a causal-rock change takes place along the Glencairn-Lytle contact. The platy sandstone 3'± at #4, becomes progressively thicker; the white silty claystone contains local lenses sand; and a massive x lam med gr ss comes in at base Glencairn.

The sand lenses in the white claystone are cherty (white) ss at Morrison, and locally this cherty sand is in contact with the massive sand at base Glencairn. This latter unit gets as much as 2.0 thick and generally has at least an intraCl at base & locally contains chert pebbles. From #5 to road (where visible) the platey ss sits either directly on the white claystone or on the massive ss. No shale seen below it.

Diagrammatic sketch of nature of variations in units along contact




(6) and (7) At both these localities the Dakota is split by shale and the upper sandstone swings down the back slope of the ridge while the lower continues to hold the crest.

AIN 49-08 (cont.)

(8.) At this point the two massive coltic sands are spread apart by thickening of intervening shale, the thinner lower bed crops the prominence jutting out beyond the usual slope to the west, while the upper continues up the gulley. There is no faulting in here, the unusual pattern of topog is entirely result of separation of sandstones

(9.) This ledge is the lower cgl ledge it has thin zones of intracgl and where thickest zones of chert pebble cgl. Red + green shale separates it from the lower of the two beds mentioned above.

(10.) Good shale-on-claystone Glencairn-Lytle contact.

Notes on Turkey Creek gap area.

Dakota, has middle coal spl that isn't developed in gap itself. Clay not thick enough to be important.

Glencairn-Lytle contact shows, commonly shale on claystone no cgl or only thin layer. See 3 above

Base of Lytle:- a toss-up. The Lytle consists of lenses of ss + cgl. ss The lower one is well below the Glencairn-Lytle contact, as in N. Gap sec. and Plainview section. It has few thickness of red + green shale between it and next higher. In this area there are two principal cgl ss zones above the basal one, and several thinner beds. Glencairn clay is either out or in high silty phase.

(11.) A large block of cgl ss here. Seems to be in place but may be float, falls in line with lower cgl crop and altitude seems O.K.

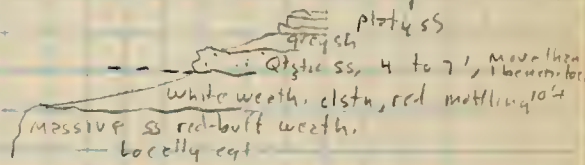
AIN 50-21

① Lytle Glencairn contact, near telephone pole. Shows Gray, loc. cgl. ss on white ss.

AIN 49-08 (cont)

12 Trench thru upper part Glencairn shows dominantly shaly ss material, no good bedrock crop, no good clay showing

13. Lytle-Glencairn contact well exposed here


platy ss
grayish
Qtzitic ss, 4 to 7', Many thin beds, fibrous,
white weath. clsty, red mottling 10'+
massive ss red-buff weath.
locally cgl

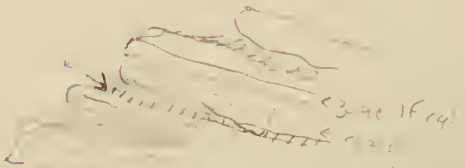
14, Local cgltic lense at base Glencairn. To N. ~~it is ss on ss at contact in some places~~ this ss not cgl + up to 5 ft thick

15 Clay bed in middle of Dakota - plastic & flint clay in crusty surface in crop but no exposure of bed. worth investigating

See ~~this~~ section in Itbk 7, p. 7

This prob. Thick
B. Dock
Vzn " 1954

Morrison Terra Cotta, - C. Wolff.
Made art pottery, sill tile, terra cotta garden
ware, from Lorraine clay, also from G. Biggins
(once Mgr Denver Pressed Brick) 1935 to 1942.



AIN-50-19

1. Best exposure of lower half of Graneros in area. Find out who takes shale from here & what. Get section of it, Rustler mine - Robinson.

2. Bedding surface on top of massive ss N 4° E, 36° E (This at base of clay & bentonite just under ?

* appx Old tunnel. Cuts bentonite-clay & goes on in still open.

3. Here platy ss comes up & clay bed comes into it, lower part of ss ledges is ledge former

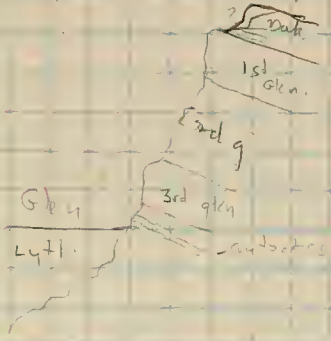
4 Clay bed in 3 areas wide here to E, makes bench, to

5. Massive x-lam ss comes in over top split of platy ss cuts into clay (with bed 3 ft thick) over this ss & merges with it. becomes ledge former.

6. Massive x-lam conglom. ss orange to pink stain Fe specks. Above on this slope 2 more ledges, next up is coarse cgl ss then one of med-coarse ss.

7. Good exposure of Glencairn from first ss of it down to Lytle Contact. All along ridge from above 6 to here the 1st Glencairn caps hogback, is thick, even bedded x bedded to platy with some massive zones & intraform cgl local, at base. It thickens abruptly just E of 6. At 7 and north and south of it the Lytle Glencairn contact just below the second

7 (cont.) ledge on the scarp. It consists of approx
to Howell section, taken
at 7. (thicknesses approx)




Base 3rd Glenarvon sand

1.5 to 2.0± Brownish gray silty to sandy shale with lite gray brownish cast (from lignitic material?)

3.0 - 4.0 Massive x bedd. fine gr. ss. lite gray loc fe stain but less so than above; this same ss at loc never bleached. Unit has some cgl zones.

2.0± Argillaceous fine ss gradational with above

1.0± Dark gray, to black carb. shale grading to dk claystone ↓

3.0+ Claystone ~~gray~~ sandy greenish cast ~~green~~ gray, weathers light gray with pink red stain, + some yellow stain on sandy zones.

Contact probably at base of dk shale + claystone. For mapping position below 3rd Glenarvon ss ledge is good guide.

8. Ridge crest shows Dakota contact, and Dak. caps ridge at this point with coarse reddish weathering ss discont. on what is lee of clay bed at top Glenarvon

AIN 50-19

8. (cont)

Section across Dakota Glencairn contact

① Dakota - (in part)

2.0 Medium to coarse grn ss. with interformational cgl.

Discont. (channel.)

0.1 Local lense white weathg bentonitic clay,

.8 Shaly clay, silty with local thin beds & laminae silt, weathg blue gray to gray

1.0 Interbedded shaly clay as above and beds siltstone, av. .5 thick. Lcl

.6 Shaly clay as above.

1.0 " " " " with thin interbeds and laminae siltstone.

2.0± Massive fine to med. gr ss.

.5 Zone friable ss continuous with above but opens locally to contain few inches of shaly clay with bentonitic lenses locally.

Upper 5.0± First Glencairn ss massive ledge irreg bedded ss.

9. At this point, just N of where Dakota leaves ridge crest, The clay bed between the 1st & 2nd Glencairn ss units pinches out and the two ss. join.

10.1 First Glencairn excessively thick here, may join with 2nd above locally. Scallop in rock probably due to local thickening of upper clay, but it is thin, iron cmtd, still not very thick

57

11. Our Atzmed section measured here, from Dakota thru ~~Lower~~ Glencairn.

12. Small opening bottom of clay. - Air way to stope from nearby mine - one on Morrison road below gap?

13 Thin clay bed comes into section here, old quarry unit. It is probably one of the 3 beds above the main bed, seems to come in just above base of Dakota. About 2.5 ft fair plastic with trieble wisse clay

Get this measured in detail

14 Main clay bed ~~suddenly~~ attains full thickness here, joining with bed above (see 13.) Clays begin to thicken about where Dakota contact swings back of cliff edge.

15. N. of saddle Glencairn Sec 3 is thinner than to south end does not form continuous ledge. Thickens to South & is ledge meter to Alexander Brown & beyond